Project Narrative: Minneapolis Saint Paul Solar Districts

The Minneapolis Saint Paul Solar Cities partnership has a specific goal of transforming the market to enable large-scale solar energy investment within the cities by 2015. In order to achieve this goal the cities must partner with entities that can develop and implement large scale solar projects. The district energy systems in the downtown cores of the two cities play an important role in the delivery of energy services to commercial buildings, medical complexes, entertainment venues, residential and government buildings. The cities of Minneapolis and Saint Paul will work with two local district energy providers to investigate and demonstrate the value of using district energy systems to leverage large scale solar investment and create transformative actions in the energy market.

A district energy system derives energy from one or more sources and uses a system of underground pipes to aggregate and serve the thermal energy needs of proximate users. A district system can range in size from a handful of users to thousands depending on the type of generation and method and distance of distribution. This method of networking users and aggregating their thermal energy load offers advantages over single source generation and consumption, including efficiencies and fuel flexibility. Systems can utilize steam, hot water, or chilled water to distribute thermal energy via piping networks to connected buildings.

The proposed solar district energy project will document how solar energy, (including solar thermal and hybrid solar thermal/photovoltaic (PV) systems, may be integrated to serve multiple users. The demonstration will examine both how solar energy supplements existing district energy systems from a technological perspective (integrating solar as a generating input to the district energy system) and from a business model perspective (adding value to the energy services provided by the district energy system). In addition this investigation will review the potential for new solar thermal district systems as demonstrated in the European market.

Saint Paul and Minneapolis are uniquely positioned to demonstrate the concept of using district energy systems to help transform markets and commercialize solar technology. The proposed project would examine the opportunities for solar investment under three distinct types of district energy systems with three distinct business models:

- District Energy St. Paul ("DESP") is a 501(c)(3) non-profit utility entity with a hot water district energy system that heats over 80 percent of buildings in downtown Saint Paul, approximately 200 buildings. DESP has already made substantial investments in transforming itself into a 'green' energy provider. DESP has been investigating opportunities to integrate large scale solar into its system, installing 6 panels near its downtown plant in 2008 for testing purposes. DESP is prepared to collaborate with the Solar Cities project on more detailed engineering and economic analysis that will result in solar investment, and is prepared to invest in a large scale installation if site, engineering, and economic analyses warrant the investment.
- NRG Energy Center Minneapolis LLC ("MEC" or "Minneapolis Energy Center") is a for-profit business that provides energy-efficient and environmentally sound district heating and/or cooling services to buildings in downtown Minneapolis, Minnesota. It also operates a separate district heating system, which serves a hospital and university, and a separate district energy system (steam heating and chilled water) which serves Hennepin County buildings. MEC produces and distributes steam and hot water for heating and

chilled water for cooling. And it serves more than 100 downtown buildings, heating more than 43 million square feet of space (over 70% of commercial space) and cooling more than 22 million square feet. NRG provides heat to several Minneapolis City government buildings that could serve as demonstration sites for demand-side installation of solar. NRG has not yet investigated the potential for solar investment on its Minneapolis system, but looks forward to taking part in this effort by committing to participate in the assessments of solar value and to deploying demonstration projects if justified by the study.

- Hennepin County Energy Center ("HCEC") – a public district energy system that provides steam to several large county facilities located in downtown Minneapolis including the Hennepin County Medical Center. Hennepin County also owns the waste-to-energy facility in Minneapolis, selling electricity to Xcel Energy and steam to MEC. Hennepin County has not studied the viability of incorporating solar into HCEC operations, but has made solar investments on other facilities. Hennepin County has made a commitment through its "Cool Counties" initiative to work toward reducing regional Greenhouse Gas emissions by 80% by 2050 and would find a viability study of HCEC operations useful in its planning process because HCEC is currently the County's second largest sources of direct emissions.

Project Objectives

This project intends to demonstrate the value of using solar thermal (and combination thermal/PV) integrated with district systems leading to large scale solar investment and transformative actions in the energy market. The success of this project will be measured by the following objectives:

- Addition of two leading district energy system operators to the Minneapolis Saint Paul Solar America Cities partnership.
- Inventory and assess the most suitable solar thermal and thermal/PV technologies for large scale building installation.
- Complete comprehensive site assessments to identify projects with highest potential performance and adaptability to a solar energy system.
- Engineer and install one (or more) large scale solar system(s) that can highlight solar thermal, integrated thermal/PV, and/or installations that service multiple buildings.
- Publish report identifying the successful economic and technical factors of the project. This report will include a set of recommendations to increase large scale solar market within district energy systems.

Merit Review Criterion

Criterion 1: Project Description

1.1 Describe the approach to overcoming key barriers that hinder the city from reaching its solar energy goals.

The Minneapolis Saint Paul Solar Cities has a unique opportunity to address common market barriers to large scale solar commercialization. This project is designed to address all of these barriers:

- *Low effective market penetration of solar thermal systems.* This project will serve as a high visibility reminder of the utility and economic efficiency of solar thermal. Although there have been local programs to encourage solar thermal in small, independent residential applications, this region has not been exposed to a large-scale practical application or the potential to connect and/or store the thermal energy created. Additionally, there is a lack of awareness of the cost-effectiveness of such installations, which will be emphasized during assessments and highlighted during installation and reporting.
- *Lack of viable and tested business models for using solar thermal to connect energy needs in multiple building.* Both district energy and solar thermal are widely integrated in Europe because of their high efficiency and economic benefits. Despite the proven technical feasibility, there are no current examples of a U.S. solar thermal installation being used to service multiple buildings. This project will expose planners, developers, and energy consultants to the viability of these types of installations. Assessments will be done on a wide range of buildings, including academic, health care, and government, which will provide data for a range of energy needs and business models. Reporting and recommendations will focus on the adaptability of such projects to unique markets and building configurations.
- *Implementation gap for tested and available technologies.* This project will include in its assessment a minimum of three solar technologies not currently introduced in this market. All of these technologies have been either certified in the U.S. or Europe, but have not been implemented in Minnesota or with district systems. The technology needs wider exposure in this market with local test results to be made available to potential users. This may also lead to increased domestic production of these proven technologies.
- *Lack of funding for implementing large scale city-owned solar projects.* Given the financial constraints for today's city managers and planners, it is important to work with private parties to identify ways to continue to expand the solar market. Utilities play an important role in energy planning and delivery and are ideal partners, particularly when there is a financial commitment to expand solar within their resource portfolios.

1.2 As appropriate, describe the plan for how the project will continue after this initial DOE funding has been depleted.

The goal of the solar assessments and demonstration installations is to enable the district energy systems to continue to make solar investments where opportunities exist. As solar approaches cost parity with other energy sources, and as the solar thermal industry matures, additional solar investment opportunities will be available to these and other district energy systems nationwide.

Transforming this niche market for solar by facilitating district energy systems to implement successful solar projects early will result in additional large-scale solar investment over time.

1.3 Describe how the project can serve as a model for replication within the applicant city, by other cities and/or other jurisdictions.

District energy systems can be found in many urban areas and college and university campuses, including a number of DOE's Solar America Cities, and almost always are located in the densest, most job intensive areas of the urban core. They sell and buy energy, make significant infrastructural investment in energy delivery systems, and make large scale delivery of energy services within a retail market. District systems therefore can play a significant role as solar energy investors by:

- capturing the long-term value of investments in solar energy infrastructure,
- providing a vehicle for customer-focused solar investment, and
- diversifying the fuel source for some types of energy products. But few, if any, U.S. district energy systems have entered into the solar energy market, either to secure energy supply or to diversify energy services.

In addition to supplementing existing district systems, the creation of urban solar district systems may offer superior replicability. These systems would use the existing model of production and distribution of a district system, with solar as the primary generation source. A solar installation on one or more buildings can be connected to proximate buildings using hot water generated by the solar installation to deliver thermal energy to the buildings. These networks could be as small as a single building or implemented city-wide with multiple solar installments contributing to the needs of the system. An urban solar district system can be implemented in any city with proximate buildings that use hot water systems, have adequate roof support and space, and a need for heating and/or hot water production.

By demonstrating that district energy systems as viable solar investment opportunities the proposed project could be replicated in cities across the nation. Promoting district energy systems to incorporate solar energy opens a door to large-scale urban investment in solar infrastructure, in locations where energy use and job density is greatest.

An additional possibility for replication may involve the testing of combination solar thermal/PV systems that are already being used in Europe. These technologies could be utilized in all the areas currently rated for solar potential but would maximize the efficiency of both thermal and electric production through an interdependent installation. Increased production by the thermal component will increase the production from the electric component. There are three technologies currently available for this integration and future replication.

Combined solar energy systems

Combined solar energy systems could be utilized in all areas with favorable solar potential but would maximize the production of both thermal and electric production through an interdependent installation. Increased production by the thermal component will increase the production from the electric component by drawing heat away from the PV modules. There are two technologies available for this integration and future replication.

Combined concentrator

Combined concentrators focus the direct solar radiation on a PV-receiver that can withstand high concentrations. However, PV cells are heated which would decrease their production capacity. Integrating a fluid to cool the PV cells enables the electrical conversion efficiency to be maintained. Therefore, combining thermal with PV technology actually increases the electrical output of the panels. Also, the thermal output of this system is high compared to stand alone or typical thermal collectors.

Concentrating technologies are dependent on direct solar radiation. In order to collect as much radiation as possible, concentrator technologies employ tracking systems.

PV/T

PV production capacity decreases with an increase in temperatures. By adding a cooling fluid, the electrical efficiency can be kept high and also the thermal energy transferred to the fluid can be used for heating. Thereby, this technology increases the electrical output from the system by adding thermal technology. The combination makes the panels much more efficient than ordinary PV-panels and also gives a high thermal output. There is also a possibility to choose just thermal production, or both thermal and electrical, depending on the outlet temperature demand.

1.4 Describe the impact of the project on the city's long-term goal for solar energy.

The goal under the Minneapolis Saint Paul Solar America Cities grant is to increase solar capacity in the Twin cities five fold within the grant period and to move solar energy to the mainstream beyond the grant period. By enabling Minneapolis Saint Paul district energy system operators to capture the benefits of solar energy within each entity's business model and energy delivery system, the cities will facilitate long-term, ongoing investment in large-scale solar projects and be better positioned to continue working with this important utility sector. The near-term opportunity for large-scale investment on DESP's system will promote solar thermal development within city limits whereas the initial Solar America Cities grant focused largely on solar PV development. Additional opportunities to leverage investment by MEC and HCEC will also advance Solar America Cities' program goals.

Moreover, by documenting the financial, operational and physical viability of large-scale solar thermal opportunities, the cities can add much needed information that may help jump-start the solar thermal industry's penetration into urban markets, which has lagged behind the development of solar PV infrastructure. The project opportunity is also relevant outside downtown areas in hospitals, industrial parks, campuses and other clusters. This project will demonstrate creative models for enhancing the value and initiation of district energy systems through solar investment.

1.5 Describe how the project directly or indirectly will assist the city in reaching the installation targets.

This grant is critical for highlighting the opportunity that solar thermal presents in the Minneapolis Saint Paul area and to cities in the Upper Midwest meeting our energy needs. The outcomes from this grant will be directly transferable to other smaller district energy systems in the two cities. By building stronger partnerships with district energy systems – a group that has been historically left out of the solar discussion – we can work toward increasing solar visibility with large scale systems deployed regionally. Currently, most solar thermal installations in

Minnesota and the Upper Midwest are residential scale with very few systems exceeding six to 10 collectors. This grant will help highlight the benefits of commercial scale solar thermal and solar hybrid thermal/PV.

1.6 Provide details on how the city intends to utilize project funds on this project.

Project funds will be invested in assessing solar market and building potential within Minneapolis Saint Paul. Assessment will include identifying buildings with hot water heating, solar generation potential, adequate roofs for installation, and other criteria as identified in the draft Solar District Scorecard. Once assessments are completed, one or two large scale projects will be identified for installation in 2010. Both DESP and MEC have done preliminary reviews of their networks to identify potential projects. Additional projects will be identified through assessments and projects will be selected according to the priorities identified in the Solar District Scorecard. The majority of project funding will be dedicated to engineering, equipment and installation. A smaller portion fund performance evaluation, reporting, a webinar presentation, and recommendations. Additional detail can be found in the attached project budgets.

1.7 Describe how the project will enhance key activities within the city that cannot be adequately addressed under their existing Solar America City award, while complementing those existing activities.

The Solar District Proposal builds from the multi-level, multi-partner success of the existing Solar America Cities award. The existing award enabled a legislative collaborative that raised political and market awareness of solar opportunities in Minneapolis Saint Paul and statewide. This brought utilities to the table to explore potential solar investment options focused largely on PV. MEC and DESP are primarily thermal energy companies serving larger scale commercial, retail, government and residential customers. While the existing grant has opened avenues for project development, it does not explicitly fund and incentivize exploration of solar district energy systems, best technology options, or in-the-ground projects.

This additional funding mechanism will support assessments and installations that would not happen otherwise. These and other utilities will be more likely to make future investments in public and private solar installations building on the success of this project. Furthermore, the Cities can use the success of these assessments and installations to increase solar penetration and attract and maintain new businesses with a solar district energy showcase.

Technically, the Solar America Cities grant will end in 2010; this proposal is a vital to continuing dedication of state and local policy makers and utilities' time to creating a viable solar market in Minnesota, where attention is historically focused on wind power deployment.

This grant opportunity would extend the formal partnership created around the Solar America Cities program between the City of Minneapolis, City of Saint Paul, and the state of Minnesota. The successes of this partnership are many with opportunities to redouble city, state, and utility efforts around solar district energy systems.

Criterion 2: Project Implementation Plan

2.1 Describe the proposed activities and discuss how the project will be implemented

The proposed activities under the grant include four distinct components:

1. Inventory and assessment of technologies and business models
2. Identifying and scoping demonstration projects
3. Installing demonstration projects
4. Assessing demonstration projects

These components will move at different rates for each of the three district energy systems, based on the existing level of analysis and the opportunities for solar investment. DESP process will build upon existing work and commitments by DESP in regard to solar assessments. The assessment should be completed within the first six to eight months of the project and should move rapidly into installation, depending on the specific outcomes of the study and availability of solar equipment. The second year would allow for performance evaluation and documentation of benefits and risks of such a large-scale investment.

The MEC and HCEC assessments do not have the same foundation of existing analysis. The assessments will need to include more detailed discussion and analysis of the appropriateness of solar investment within the business models for each energy service provider. The assessments should be concluded within the project's first year. Installation of demonstration projects would occur early in the second year, with a shorter evaluation period to finish the project.

Proposed Activities

2.1.1 Inventory and Assessment. The project will start with an assessment and inventory of existing research, the characteristics of the three district systems participating in the study, and the potential benefits of including solar thermal in their resource portfolios:.

- *Integrating solar into district energy systems.* The project will assess existing research on integrating solar thermal with district energy systems – what technologies work well together, what are the technical obstacles, how do solar thermal characteristics of Minnesota solar resource fit into potential integration?
- *Assess technical and business model characteristics.* Enter into discussions with three different types of district systems in the metro area to assess how solar would or would not integrate with their system, both technologically and from a business model standpoint. The Cities will also evaluate sites that are not currently on district systems, but with operating potential to generate solar energy from one building to service additional users.

In order to determine the highest degree of replication and market transformation, building assessments will be a critical component of this work. The following scorecard will be refined for utilization in this project. And after testing and implementation is complete, this could be shared with other potential markets. Priority items for assessing district potential will include fossil fuel usage, hot water infrastructure, building ownership and proximity, and heating loads.

Solar District Scorecard
Desktop analysis
1. Estimate the available roof space
2. What is the solar insolation for the location?
3. What is the climate at chosen location?
• Snow fall
• Hail
• Wind
4. What is the building's orientation (angle towards south)?
Building
1. Condition of and warranty for roof
• What are the restrictions for the roof?
• How many years are left on the warranty?
2. How much roof space is available for collectors?
3. What is the maximum roof load capacity?
• Does the load on the roof change during the year due to snow accumulation, events or mounting of things from inside / on outside?
4. Where and when do surrounding objects shade the roof?
5. Ability to anchor panels on roof
• What is the roof material?
• What is the roof thickness?
• What is the beam layout?
6. What is the slope of the roof?
Customer
1. What is the monthly heat usage?
• What is the minimum and maximum water temperature required in the heating system?
2. What is the monthly electrical usage?
3. What is the electrical capacity for building?
4. What is the existing heating system?
• What type of fuel is used?
• How much fuel is used?
5. Where are the connections to the HVAC system?
6. Is there space for heat storage?
• If so, where is the space?
7. Where are the connections to the electrical system?
District heating system
1. Is there an existing piping system and what is the layout?
2. Is there an ability to connect pipes between/in building/s?
3. What is the proximity of the buildings?
4. Are there any underground obstructions that may block the pipeline?

Final assessment
1. What is the total expected production capacity for the site given the above constraints?
• At what cost per therm?
• At what cost per kWh if PV proposed?
2. What is the estimated fuel savings?
• Economically
• Emissions
Information and documents required:
• Aerial picture of roof
• HVAC layout of building
• Electrical layout of building
• Structural layout

2.1.2 Identify demonstration projects. Identify pilot solar installation or demonstration projects for each entity where solar appears to hold promise from both a technical and business model perspective.

- *Solar thermal integration.* Identify opportunities for integrating solar thermal systems as either supply-side inputs to the district energy system or as demand-side investment for district energy customers or buildings. Identify the specific goals of the integration, such as: diversify fuel supply, reduce carbon footprint or meet climate protection goals, position the district energy system to capture future solar investment opportunities, cost-effectively pre-heat water on either supply, return or demand-side of the system, etc. This technology will also work as mentioned above, without an existing "district system". Buildings in close proximity with the ability to link energy systems could also be considered. Examples include hospitals, industrial parks, business and academic campuses.
- *Solar electric integration.* Identify opportunities for district energy systems to provide value-added services via solar electric investment. Identify the specific goals of the integrations, such as: provide a financing/ energy service vehicle for customers to make solar investments, position the company to expand energy service offerings beyond heating or cooling, integrate solar thermal and solar electric technologies to capture synergies, etc.
- *Solar thermal and electrical integration.* Identify opportunities for integrating combined solar thermal and solar electric systems as contributors both to the district energy system and value-added services for customers.

2.1.3 Install demonstration projects. Create the pilot project or program and monitor results, documenting opportunities and difficulties.

- *Competitively bid systems.* Create bidding specifications for equipment, turn-key installation, or other method of installing solar demonstration, select contractor/vendor, and install demonstration project.

- *Monitor results.* Create evaluation criteria for system performance based on the rationale or justification for the demonstration. After system is installed monitor the results to evaluate performance against evaluation criteria

2.1.4 Assess demonstration projects. Based on performance evaluations, assess the potential for future large scale deployment of solar thermal technologies on the three district energy systems. Identify obstacles that arose during the project, attempts (successful or not) at overcoming obstacles, and opportunities for circumventing these obstacles on future projects.

2.2 Identify potential barriers to carrying out the proposed project and discuss strategy for mitigating risk.

Barriers to successful completion of the project and risk mitigation strategies include the following:

Potential Barrier	Mitigation Strategy
Lack of viable solar opportunities on the district energy system	Barrier primarily applies to NRG and Hennepin County demonstrations. Risk mitigation is addressed by assuming installations would occur in second phase (year two) of the project
Inadequate access to capital for large-scale projects	DESP has near term financing options. For NRG and DESP access to capital will be mitigated by including financial assessment into the first year assessment process
Technological complications with integrating solar into the district energy system	District Energy's analysis of its system indicates that incorporating solar thermal into its system is technically feasible.
Unavailability of selected solar technology	Assessment of opportunities will consider availability of technology in the technology selection process.
Integration of solar electric production to the electrical grid.	Partnership with the local electric utility will allow for management of policy and infrastructure considerations.

2.3 Identify key milestones and decision points. Where possible, identify quantifiable metrics that will be used for measuring project success.

Each district energy system will have the same set of milestones and decision points based on the four activity components described above:

Milestone	Description	Decision points associated with milestone	Timeline for completion
1	Issue an RFP for a project consultant	o Availability of qualified applicants	Q1
2	Completion of solar technology, economic, and customer value assessments	o Range of solar technologies to consider o Set financial assumptions o Model financial viability	Q2
3	Select demonstration project (s) meeting opportunities identified in 1.	o Building owners and utilities design agreements o Engineers begin design o Materials procured	Q2
4	Stage 1 of installations begins	o Contracts finalized, including energy services or leasing agreements o Additional projects determined	Q3
5	Performance measured	o Data tracked o Financial viability verified o Technical specifications evaluated	Q4 & Q5
6	Stage 2 of installation begins	o Feasibility for expansion of first installation o Feasibility of second installation	Q6
7	Issue project report detailing the outcomes of the project	o Intended as a resource for other cities, district energy system owners and operators	Q7
8	Host webinar covering highlights of report	o Dependent on timing and funding conflicts	Q8

Each district energy project will, however, reach these milestones and decision points on its own time frame. The Saint Paul DESP project, including installation, will occur in year one of the project under the Recovery Act funding portion of the grant. The HCEC and MEC projects will complete milestones 1 and 2 in Year 1, and will expect to complete milestones 3 and 4 in Year 2 if appropriate projects are identified. Milestone 5, Stage 2 of installations will be determined after assessments are completed.

Criterion 3: Roles, Responsibilities, Capabilities, Knowledge and Experience

3.1 Describe the organizational structure of the entity that will perform the proposed project, including roles, responsibilities and qualifications of key personnel to accomplish the goals of the project

Saint Paul's primary role will be fiscal agent in this project. The City of Minneapolis and Minnesota Office of Energy Security (OES) will support the City of Saint Paul in the execution of the following responsibilities including, project oversight and management, coordination of sub awardees and other Solar Cities stakeholders, and production and distribution of assessments and recommendations. These activities may include selection and hiring of consultants, time and budget management, media relations, reporting and review, and additional activities necessary to share success for market transformation. Key personnel will include Anne Hunt, Environmental Policy Director , Jim Giebel, Energy Coordinator, who bring a combined 40 years in environment, construction, policy, and project management to this initiative. Additional information can be found in the biographical sketches.

DESP is committed to the inclusion of solar thermal within its service territory and will be responsible for identifying the best installation site(s) to maximize the use of solar energy to their customers. DEPS commits to providing a 50% match for installations within their service territory based on the technical findings of the site assessments.

As a speculative project partner, MEC will be responsible for identifying those sites within its service territory that merit an in depth solar thermal site assessment.

3.2 Describe the Applicant's plan to collaborate with partners

The City of Saint Paul is expanding its existing Solar America Cities partnerships with the City of Minneapolis and the OES. Additional partners include the following:

Utilities:

DESP - District Energy St. Paul will provide matching funds for assessments, studies and solar installations in Saint Paul, as deemed feasible and appropriate.

MEC – Minneapolis Energy Center will provide matching funds for assessments, studies and installations in Minneapolis, as deemed feasible and appropriate.

Xcel Energy - Xcel Energy is providing technical and policy recommendations regarding funding and implementation of any installations involving PV.

Non-Profits:

Minnesota Center for Energy and Environment - MNCEE is an existing project partner and may be involved in assessing buildings and energy profiles.

Fresh Energy – Fresh Energy has been working with the Solar Cities on policy initiatives and climate change strategies.-

Demonstration Project Partners:

The Saint Paul RiverCentre has agreed to evaluate the potential of their building, which is already connected to the DESP hot water system. Actual financial and technical logistics will be determined during Phase 1 of this initiative. Please see the attached letter of support.

Co-Leaders	**Support Team**
Anne Hunt, City of Saint Paul	Minnesota Office of Energy Security
Gayle Prest, City of Minneapolis	Xcel Energy
Project Consultant	Minnesota Center for Energy and Environment
To Be Determined by competitive RFP	Fresh Energy
	Saint Paul RiverCentre
Utility Partners	
District Energy St. Paul	Minneapolis Energy Center

CITY OF SAINT PAUL
Christopher B. Coleman, Mayor

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July 30, 2009

Nancy Kiyota
Department of Energy
Golden Field Office
1617 Cole Boulevard
Golden, CO 80401-3393

Re: 2009 Solar America Cities Solar Market Transformation –
Minneapolis Saint Paul Application

Dear Ms. Kiyota:

I am pleased to provide this letter of commitment of on behalf of the City of Saint Paul for the 2009 Solar America Cities Solar Market Transformation (Funding Opportunity Announcement Number DE-FOA-0000078).

Together with the City of Minneapolis, we are seeking funds to demonstrate the value of integrating solar thermal and combination thermal/photovoltaic (PV) with district energy systems. The implementation of this project will result in large scale solar investments and transformative actions in the energy market in our community.

Over the last decade, businesses, utilities, community and environmental organizations have worked to make our region a leader in sustainability and protecting our urban environment. The Cities of Saint Paul and Minneapolis have assembled for this application a remarkable team including District Energy Saint Paul, NRG Energy Center, the Minnesota Office of Energy Security, Hennepin County and RiverCentre Convention and Vistors Authority. Your support will help us take the next steps to advance the widespread use of solar throughout Minnesota.

If you need additional information about the grant application, please contact Anne Hunt, Deputy Policy Director – Environment, at 651.266.8520 or anne.hunt@ci.stpaul.mn.us. Let me thank you in advance for your consideration of this request. Your support will advance our efforts significantly.

Sincerely,

Christopher B. Coleman
Mayor

DISTRICT ENERGY
ST. PAUL™

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July 27, 2009

Nancy Kiyota
Department of Energy
Golden Field Office
1617 Cole Boulevard
Golden, Colorado 80401-3393

Ms. Kiyota:

District Energy St. Paul is thrilled to have the opportunity to work with the Minneapolis Saint Paul Solar America Cities initiative. District Energy operates North America's largest hot water district energy system served by a biomass fueled combined heat and power plant. Incorporated 30 years ago as a private 501(c)3 non-profit utility, District Energy currently provides heating and cooling to over 80 percent of downtown Saint Paul, Minnesota. District Energy St. Paul is recognized worldwide as an industry leader and is used as a model for other cities and communities. Each year we host hundreds of visitors, from around the country and the world, seeking to become more sustainable and secure their energy future.

As proud as we are of our successes, we are constantly looking for solutions to ensure that our future services will be cost-effective for our customers and fully sustainable. To date we are using biomass to generate approximately 70 percent of our energy for our heating customers. And our board of directors has set a company goal to be 100 percent renewable. We believe solar energy will serve a critical role in achieving that goal. Integrating solar with a hot water district system, or other free-standing hot water buildings, is well practiced in several European countries. This grant opportunity provides an ideal opportunity to implement a large scale project and launch the use of this effective solution in the United States. Unfortunately, as a small 501(c)3 non-profit company there remains an economic gap that inhibits us from completely self funding a project at this time. This is why we are seeking the project collaboration and support of the Solar America Cities.

District Energy has been actively evaluating the integration of solar into our current system, including its future use in our master planning. We are committed to integrating the use of solar and are prepared to be an integral part of the 2009 grant application. We understand the importance of completing initial building assessments, and feel there are great opportunities for projects in our Saint Paul service territory. Additionally, we have identified at least one key, high-profile public building that has offered its partnership in developing a solar installation in the next 24 months. Given this, District Energy is committed to providing matching financial support both to study projects in our

service territory and to design and implement a significant installation on one of our customers' buildings in downtown Saint Paul.

Meeting the future energy needs of our cities requires the integration of multiple, sustainable energy sources, and solar will play a key role. We are committed to integrating solar into District Energy's heating system. A grant from Solar America Cities will enable us to overcome the current economic gap of a project, and showcase how solar can be used to transform the future of cities throughout the US.

We are incredibly grateful to the Cities of Minneapolis and Saint Paul, and the Minnesota Office of Energy Security, for their support and collaboration on this great opportunity.

Thank you for your good work and the opportunity to participate in transforming the solar market.

Sincerely,

Sincerely,
District Energy St. Paul, Inc.

Ken Smith

Minneapolis
City of Lakes

Office of the Mayor

R. T. Rybak
Mayor

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July 28, 2009

To Whom It May Concern:

I am pleased to provide this letter of support on behalf of the Minneapolis and St. Paul Solar Market Transformation Topic 1 grant application.

We are eager to continue our partnership with the City of Saint Paul formed under a Solar America Cities grant in transforming solar accessibility both here and across the nation. The two cities, and the two district energy systems, supported by these funds, will investigate and demonstrate the value of using district energy systems to leverage solar investment. European cities are already using solar in their district energy systems, but we are not aware of any such systems in the United States at this time. With this large undeveloped potential in the district energy systems in the country, this grant will assist in furthering the development of a vibrant solar industry.

Our primary partners, Saint Paul District Energy and NRG Thermal, Minneapolis offer different perspectives (non profit and for profit entities) and heating systems (hot water and steam) that will allow for a more detailed assessment than in most other areas. Both have already demonstrated their commitment to lowering the carbon footprint of district heating. District Energy Saint Paul uses biomass as their primary fuel source and NRG Thermal is in the midst of adding a renewable resource as well. NRG's parent company is also an investor in E-Solar – a utility scale solar company.

Minneapolis and Saint Paul have proven their ability to manage solar grants through our existing Solar America Cities grant. Accomplishments to date include establishing a coordinated multi-stakeholder working group that resulted in passage of strong state solar legislation, installed and showcased two solar charging systems for plug-in hybrid cars for HourCar, a local non-profit's car sharing program and developing opportunities to connect and showcase energy efficiency and solar in the development of the planned Central Corridor light rail project in Minneapolis and Saint Paul..

The City of Minneapolis has already made a commitment to implementing solar projects on its own facilities and in assisting the private sector. However, we are ready to do more. Your support will help us take this next step.

Please contact the City of Minneapolis Sustainability Coordinator Gayle Prest at 612-673-2931 for any further information. Thank you for your consideration of this request.

R.T. Rybak

Minneapolis Mayor

Energy Center
Minneapolis

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Phone 612.436-4108
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July 27, 2009

Nancy Kiyota
U.S. Department of Energy
Golden Field Office
1617 Cole Boulevard
Golden, CO 80401-3393

Ms. Kiyota:

NRG Energy Center Minneapolis LLC ("Minneapolis Energy Center" or "MEC") is please to work with the Minneapolis Saint Paul Solar America Cities initiative. Minneapolis Energy Center provides energy-efficient and environmentally sound district heating and/or cooling services to buildings in downtown Minneapolis, Minnesota. It also operates a separate district heating system, which serves a hospital and university. MEC produces and distributes steam and hot water for heating and chilled water for cooling, serving more than 100 downtown buildings, heating more than 43 million square feet of space and cooling more than 22 million square feet.

In 1996, the Minneapolis Energy Center was named System of the Year by the International District Energy Association. MEC is a wholly owned subsidiary of NRG Thermal LLC, an NRG Energy Inc. company.

MEC prides itself on being the energy resource for our customers to help them run their buildings in an energy efficient manner. We are an EPA Energy Star Service Partner and three of our employees are LEED Accredited Professionals. We have partnered with the local natural gas utility to offer comprehensive energy audits and provide rebates for achieving energy improvements.

In early 2009, MEC and Hennepin County constructed a high pressure steam line to connect the Hennepin County Resource Center (a waste to energy facility located on the western edge of the downtown core) to the MEC steam distribution system and now purchase HERC's excess steam, a source of low-cost green energy for our customers. We continually look for opportunities to improve our system efficiencies, thus providing cost effective thermal energy to our customers. This fall we will begin construction of a

waste heat recovery system on our main steam plant's flue gas, capturing and recycling both the heat and the water currently exhausted through our stacks. This will improve our overall system thermal efficiency by 6 – 7%.

Finding methods to integrate solar into our steam supply system will allow us to continue to improve our efficiency and environmental effectiveness. Given this, NRG Energy Center Minneapolis LLC is committed to providing matching financial support both to study projects in our service territory and, contingent upon viability, to design and implement a significant installation within our service territory.

Meeting the future energy needs of our cities requires the integration of multiple, sustainable energy sources, and solar will play a key role. A grant from Solar America Cities will enable us to overcome the current economic gap of a project, and showcase how solar can be used to transform the future of cities throughout the US.

We thank the Cities of Minneapolis and Saint Paul, the Minnesota Office of Energy Security, and our fellow district energy business in Saint Paul, District Energy Saint Paul, for their support and collaboration on this opportunity.

Thank you for the opportunity to participate in transforming the solar market.

Sincerely,
NRG Energy Center Minneapolis LLC

Michael Carroll, P.E.
LEED Accredited Professional
President

office of energy security

85 7th Place East, Suite 500, St. Paul, MN 55101-2198
main: 651.296.4026 tty: 651.296.2860 fax: 651.297.7891
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July 27, 2009

Nancy Kiyota
Department of Energy
Golden Field Office
1617 Cole Boulevard
Golden, Colorado 80401-3393

Ms. Kiyota:

The Minnesota Office of Energy Security (OES) is pleased to support the Minneapolis Saint Paul solar thermal district energy proposal. OES welcomes the opportunity to continue to work with Minneapolis Saint Paul Solar America Cities to develop a sustainable solar infrastructure that can serve as a model for other municipalities in the Upper Midwest. We are pleased that the *Solar America Cities* partnership has raised the visibility of solar thermal and photovoltaics statewide among consumers, elected officials, and the workforce.

The Minnesota Office of Energy Security commits 50 hours from the non-federally funded portion of the State Program Administrator's time, which is valued at approximately $1,800. In addition to the non-federal cost-share, the Minnesota Department of Commerce plans to assign additional hours of this Program Administrator time and other staff as needed from its federally funded positions to assure that the solar thermal team reaches its goals.

According to OES records, the proposed district energy solar thermal project in Saint Paul would be the largest solar thermal installation in the state by an order of magnitude. Further, the proposed location is a high visibility area with tens of thousands of visitors weekly. The innovative project is both replicable and expandable with enthusiastic support from the district energy utilities. It is the type of project that has the capacity to launch real market transformation activity.

Renewable energy is a high priority in Minnesota for economic, environmental, and energy security reasons. This project will advance the state of Minnesota's energy policy goals by:

1) reducing the per capita use of fossil fuel as an energy input by 1.5 percent per year for ten years through increased reliance on energy efficiency and renewable energy alternatives *(Minn. Statutes 2007 216C.05, subdivision 2)*;
2) obtaining 25 percent of the total energy used in the state from renewable energy resources by the year 2025 (*Minn Laws 2007, Ch 3)*; and
3) reducing greenhouse gas emissions by 80% by 2050 along with interim targets (*Minn Laws 2007, Ch 136, Art 5*).

We applaud the Twin Cities' solar efforts and look forward to continuing the Solar America Cities partnership.

Sincerely,

Janet Streff

Janet Streff, Manager
State Energy Office

SAINT PAUL

WHERE ADVENTURE BEGINS

Official Convention & Visitors Authority

July 29, 2009

Anne Hunt
Mayor Chris Coleman's Office
390 City Hall
15 West Kellogg Boulevard
Saint Paul, MN 55102

Ms. Hunt:

The St. Paul RiverCentre & Convention Authority (the "RCVA") is excited to explore the possibility of evaluating our building as a demonstration project site as part of the Minneapolis-Saint Paul Solar America Cities initiative.

As we have been developing the RiverCentre's comprehensive sustainability initiatives we have discussed how we could reach our goal of becoming a carbon neutral facility that includes both conservation and green energy utilization. Based on our present understanding of the demonstration project, it appears to hold the potential to make a large stride in this direction.

The facilities operated by the RCVA include the RiverCentre Convention Center and the Roy Wilkins auditorium. These facilities are also physically connected to the Xcel Energy Center. This demonstration project holds the promise to benefit all of these facilities.

District Energy is our current provider of heating and cooling and has proven to be a valuable partner and leader in green energy. They are already an important part of our sustainability benchmarking through their green initiatives including utilization of biomass. So we look forward to the possibility of expanding this partnership.

In accordance with state law, the RCVA operates the convention Center and the Roy Wilkins auditorium pursuant to a contract with the City of Saint Paul. Three of the seven Saint Paul City Councilmembers serve on our Board of Directors including the City Council President who has also been a strong advocate and partner with Mayor Coleman in making Saint Paul a leader in sustainability.

We look forward to further exploring the opportunity to participate in this Solar America Cities initiative as a demonstration project and partner with the Cities of Saint Paul and Minneapolis, and the Minnesota Office of Energy Security.

Sincerely,

Karolyn Kirchgesler

Karolyn Kirchgesler
President & CEO
RiverCentre Convention & Visitors Authority

Hennepin County

Recycled Paper

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July 28, 2009

Anne Hunt
Mayor Chris Coleman's Office
390 City Hall
15 West Kellogg Boulevard
Saint Paul, MN 55102

RE: Solar Market Transformation Grant

Ms. Hunt:

Through its membership in the "Cool Counties" initiative Hennepin County has made a commitment to work towards reducing greenhouse gas (GHG) emissions in the region by 80% by 2050. Because the Hennepin County Energy Center (HCEC) is our second largest direct source of GHG emissions, any measures that can economically reduce its emissions will be important contributions to meeting our commitment.

The HCEC distribution system is already interconnected with that of the Minneapolis Energy Center and as such, Hennepin County is pleased to support the Minneapolis Saint Paul solar thermal district energy proposal. The proposal to investigate and demonstrate the viability of using district energy systems to leverage large scale solar investment, has the potential to create transformative actions in the energy market

Hennepin County looks forward to participating in the Solar America Cities partnership.

Sincerely

Dave McNary

David McNary
Assistant Director, Department of Environmental Services